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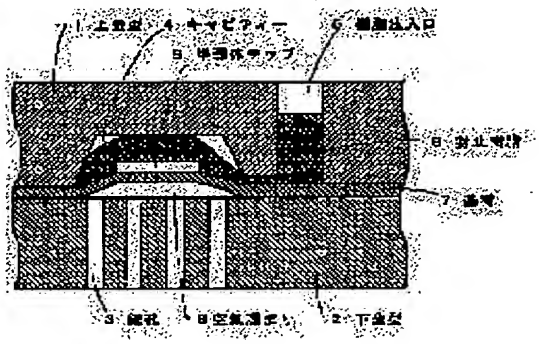
(54) RESIN SEAL MOLD FOR SEMICONDUCTOR DEVICE

(57)Abstract:
PROBLEM TO BE SOLVED: To contrive not to form an air sump between a base material and a mold and to prevent the breakage of a semiconductor chip by providing fine holes in the cavity corresponding to a region of a mold having a planar structure.
SOLUTION: Fine holes 3 are provided to the cavity corresponding region of a lower mold 2 having a planar structure. When a base material 7 is set on the lower mold 2 held to high temp. by a method accompanied by physical restriction by a positioning pin or the like, the base material 7 extends by thermal expansion and, therefore, the base material 7 does not closely come into contact with the lower mold 2 and an air sump. 8 is generated. Thereafter, when a molten seal resin 6 is injected into the cavity 4, a semiconductor chip 9 and the base material 7 are pressed to the lower mold 2 by the pressure of the injected resin but the air in the air sump. 8 is discharged from the fine holes 3 and, therefore, the semiconductor chip 9 is not broken.



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CLAIMS

[Claim(s)]
[Claim 1] For the planar structure and another side, with the metal mold of structure divided into two, one side is the resin seal metal mold for semiconductor devices which prepared pore in the field corresponding to a mold cavity of the metal mold which has the planar structure in the resin seal metal mold for single-sided plastic molded type semiconductor devices which has a concave mold cavity.
[Claim 2] Resin seal metal mold for semiconductor devices of claim 1 which constituted the metal mold which has the planar structure using the porous material.
[Claim 3] Resin seal metal mold for semiconductor devices of claim 1 which prepared the exhaust air slot or pore which considered the field corresponding to a mold cavity of the metal mold.which has the planar structure as crepe processing, and was further connected with the crepe part.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the structure of the resin seal metal mold used for the semiconductor device (it is hereafter described as a single-sided plastic molded type semiconductor device) which carried out the resin seal only of one side of the base material especially formed with a metal, resin, or a ceramic about the resin seal metal mold used for manufacture of a plastic molded type semiconductor device.
[0002]
[Description of the Prior Art] Drawing 5 shows the general configuration of a single-sided plastic molded type semiconductor device, and drawing 6 shows the sectional view. Usually, after manufacture of a single-sided plastic molded type semiconductor device equips with a semiconductor chip 9 on the base material 7 of the shape of the shape of short length by which the circuit pattern and the external electrode 13 were formed in the front face, the shape of a tape, and a sheet and connects the electrode on a semiconductor chip 9, and the electrode on a base material 7 by a gold streak 14 etc., it uses the approach of inserting with metal mold and carrying out impregnation hardening of the closure resin 6. The base material 7 is inserted into the upper metal mold 1 which drawing 7 showed the condition at the time of closure resin impregnation typically and with which it is a thing and the mold cavity 4 was formed, and the Shimokane mold 2 of the planar structure, and the closure resin 6 fused from the resin inlet 5 is poured in. In addition, although not shown in drawing, the vent hole for air-bleeders is usually prepared in the corner of a mold cavity 4.
[0003]
[Problem(s) to be Solved by the Invention] The set of the base material to metal mold usually sets a base material 7 on the Shimokane mold 2, where both metal mold is opened, and it is performed in the sequence which closes metal mold. Generally, since the temperature up of the metal mold is carried out, the base material 7 carried on the Shimokane mold 2 bends for thermal expansion, and if metal mold is closed as it is, as shown in drawing 8 , it may form the accumulator ball 8 between the Shimokane mold 2 and a base material 7. Therefore, since the air of the accumulator ball 8 did not have a refuge if closure resin is poured in in this condition, the semiconductor chip 9 was pushed aside up, on the other hand, bending stress acted to the semiconductor chip 9, and impregnation resin had a possibility of breaking a semiconductor chip 9 in order to depress a semiconductor chip 9 downward.
[0004]
[Means for Solving the Problem] This invention was made for the purpose of solving this trouble, and drawing 1 shows the sectional view of the metal mold which is one example of this invention. Two or more pores 3 are formed in the field of the Shimokane mold 2 which counters a mold cavity 4. Moreover, drawing 2 is the mimetic diagram having shown the condition of pouring in closure resin using the metal mold of drawing 1 .
[0005]
[Function] A motion of the base material in the mold cavity at the time of pouring closure resin into the metal mold of this invention using drawing 2 is explained. Since a base material 7 is extended by thermal expansion when a base material 7 is set by the approach accompanied by physical constraint with a gage pin etc. on the Shimokane mold 2 currently maintained at the elevated temperature, it does not stick to the Shimokane mold 2, but the accumulator ball 8 is produced. If the upper metal mold 1 is closed in this condition, as shown in drawing 2 , the accumulator ball 8 will be formed into a cavity 4. When the closure resin 6 fused after that is poured in into a mold cavity 4, a semiconductor chip 9 and a base material 7 are pressed down by the Shimokane mold 2 with the pressure of impregnation resin, but since the air of the accumulator ball 8 is discharged from pore 3, big bending stress which produces breakage does not join a semiconductor chip 9.
[0006]
[Example] Drawing 3 is what showed other examples of this invention, it is what used porosity material for the Shimokane mold 2 of drawing 1 , and the operation is the same as that of drawing 1 . Drawing 4 is what showed the example of further others of this invention, connects the accumulator ball of the base material lower part at the time of resin impregnation mutually by making the mold cavity field of the Shimokane mold 2 into crepe 11,

and discharges the air of an accumulator ball via the exhaust air slot 12 formed in the pore 3 or the Shimokane mold 2 which penetrates the Shimokane mold 2.

[0007]

[Effect of the Invention] Since the accumulator ball formed between a base material and the metal mold of the planar structure can be avoided if the metal mold of this invention is used when carrying out a resin seal using metal mold in a single-sided plastic molded type semiconductor device production process as explained above, the resin seal which does not require bending stress for the semiconductor chip in a semiconductor device, and does not have fear of breakage becomes possible.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the sectional view showing one example of the metal mold of this invention.
[Drawing 2] It is the mimetic diagram showing an operation of the metal mold of drawing 1 .
[Drawing 3] It is the sectional view showing other examples of the metal mold of this invention.
[Drawing 4] It is the sectional view showing other examples of the metal mold of this invention.
[Drawing 5] It is the external view of a single-sided plastic molded type semiconductor device.
[Drawing 6] It is the sectional view of a single-sided plastic molded type semiconductor device.
[Drawing 7] It is an explanatory view at the time of the resin seal of a single-sided plastic molded type semiconductor device.
[Drawing 8] It is the explanatory view showing the trouble at the time of the resin seal of a single-sided plastic molded type semiconductor device.
[Description of Notations]
1 Upper Metal Mold 2 Shimo Metal Mold 3 Pore 4 Mold Cavity
5 Resin Inlet 6 Closure Resin 7 Base Material 8 Accumulator Ball
9 Semiconductor Chip 10 Shimokane Mold by Porosity Material 11 Crepe
12 Exhaust Air Slot 13 External Terminal 14 Gold Streak

[Translation done.]

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審査請求　未請求　請求項の数３　書面　（全４頁）

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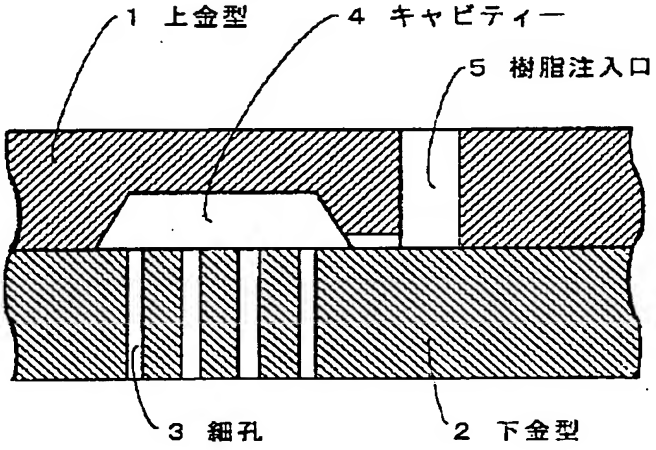
(54)【発明の名称】　半導体装置用樹脂封止金型

(57)【要約】

【目的】　樹脂封止型半導体装置を樹脂封止する際、金型のキャビティー内で発生する空気溜まりを回避し、半導体チップへの過大な応力負荷を防いで、半導体チップ折損を防止する。

【構成】　平面構造を有する金型のキャビティー領域に貫通した細孔を設ける。



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【特許請求の範囲】
【請求項１】　二つに分割した構造の金型で、一方は平面構造、他方は凹状のキャビティーを有する片側樹脂封止型半導体装置用樹脂封止金型において、平面構造を有する金型のキャビティー対応領域に細孔を設けた半導体装置用樹脂封止金型。
【請求項２】　平面構造を有する金型を多孔質材料を用いて構成した請求項１の半導体装置用樹脂封止金型。
【請求項３】　平面構造を有する金型のキャビティー対応領域を梨地加工とし、さらに梨地部分に連結した排気溝または細孔を設けた請求項１の半導体装置用樹脂封止金型。
【発明の詳細な説明】
【０００１】
【産業上の利用分野】本発明は、樹脂封止型半導体装置の製造に使用される樹脂封止金型に関し、特に金属、樹脂またはセラミック等で形成された基材の片側のみを樹脂封止した半導体装置（以下、片側樹脂封止型半導体装置と記す）に使用される樹脂封止金型の構造に関するものである。
【０００２】
【従来の技術】図５は片側樹脂封止型半導体装置の一般的な形状を示したものであり、図６はその断面図を示したものである。通常、片側樹脂封止型半導体装置の製造は表面に回路パターン及び外部電極１３が形成された短尺状、テープ状またはシート状の基材７の上に半導体チップ９を装着し、半導体チップ９上の電極と基材７上の電極を金線１４等で接続した後、金型で挟んで封止樹脂６を注入硬化させる方法を用いている。図７は封止樹脂注入時の状態を模式的に示したもので、キャビティー４が設けられた上金型１と、平面構造の下金型２に基材７が挟まれており、樹脂注入口５から溶融した封止樹脂６が注入されている。なお、図には示していないが、キャビティー４の隅には空気抜き用のベント穴が通常設けられている。
【０００３】
【発明が解決しようとする課題】金型への基材のセットは通常、両金型を開いた状態で下金型２の上に基材７をセットし、金型を閉じる順序で行われる。一般に金型は昇温されているため、下金型２の上にのせられた基材７は熱膨張のためたわみ、そのまま金型を閉じると図８に示すように下金型２と基材７の間に空気溜まり８を形成する可能性がある。したがって、もしこの状態で封止樹脂を注入すると空気溜まり８の空気は逃げ場がないため半導体チップ９を上方に押しやり、一方、注入樹脂は半導体チップ９を下に押し下げようとするため、半導体チップ９に対して曲げ応力が作用し、半導体チップ９を折損するおそれがあった。
【０００４】
【課題を解決するための手段】本発明はかかる問題点を

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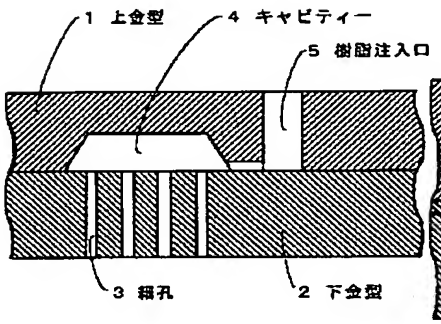
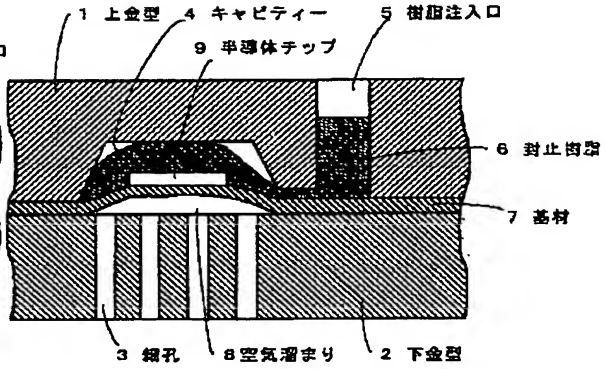
解決することを目的としてなされたもので、図１は本発明の一実施例である金型の断面図を示したものである。キャビティー４に対向する下金型２の領域に複数個の細孔３を設けている。また、図２は図１の金型を用いて封止樹脂を注入する状態を示した模式図である。
【０００５】
【作用】図２を用いて本発明の金型に封止樹脂を注入する際のキャビティー内の基材の動きを説明する。高温に保たれている下金型２の上に、位置決めピンなどにより物理的な拘束を伴なう方法で基材７をセットした場合、熱膨張により基材７は伸びるため、下金型２に密着せず空気溜まり８を生ずる。この状態で上金型１を閉じると図２に示したように空気溜まり８はキャビティ４の中に形成される。その後溶融した封止樹脂６をキャビティー４の中に注入すると、注入樹脂の圧力により半導体チップ９及び基材７は下金型２に押さえつけられるが、空気溜まり８の空気は細孔３より排出されるため、半導体チップ９には折損を生ずるような大きな曲げ応力は加わらない。
【０００６】
【実施例】図３は本発明の他の実施例を示したもので、図１の下金型２に多孔質材を用いたもので、作用は図１と同様である。図４は本発明のさらに他の実施例を示したもので、下金型２のキャビティー領域を梨地１１として樹脂注入時の基材下部の空気溜まりを相互に接続し、下金型２を貫通する細孔３または下金型２に形成した排気溝１２を経由して空気溜まりの空気を排出するものである。
【０００７】
【発明の効果】以上説明してきたように、片側樹脂封止型半導体装置製造工程において金型を用いて樹脂封止する場合、本発明の金型を用いれば基材と平面構造の金型の間に形成される空気溜まりを回避できるため、半導体装置内の半導体チップに曲げ応力がかからず折損のおそれのない樹脂封止が可能となる。
【図面の簡単な説明】
【図１】本発明の金型の一実施例を示す断面図である。
【図２】図１の金型の作用を示す模式図である。
【図３】本発明の金型の他の実施例を示す断面図である。
【図４】本発明の金型の他の実施例を示す断面図である。
【図５】片側樹脂封止型半導体装置の外観図である
【図６】片側樹脂封止型半導体装置の断面図である。
【図７】片側樹脂封止型半導体装置の樹脂封止時の説明図である。
【図８】片側樹脂封止型半導体装置の樹脂封止時の問題点を示す説明図である。
【符号の説明】
１　上金型　　２　下金型　　３　細孔

4　キャビティー
5　樹脂注入口　　6　封止樹脂　　7　基材
8　空気溜まり
9　半導体チップ　１０　多孔質材による下金型
１１　梨地
１２　排気溝　　１３　外部端子　　１４　金線

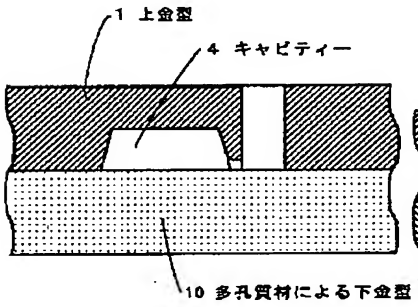
【図１】



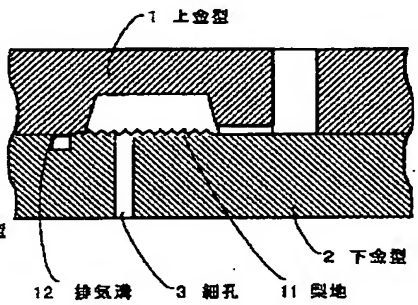
【図２】



【図３】



【図４】



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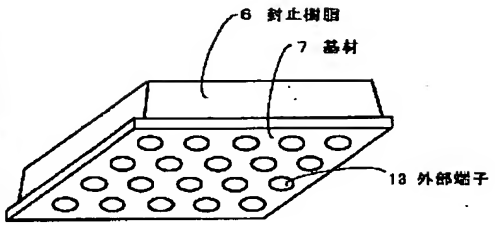
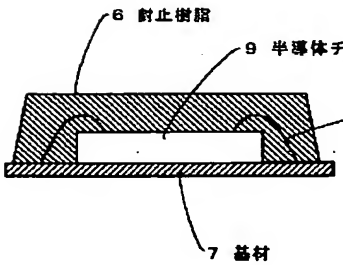
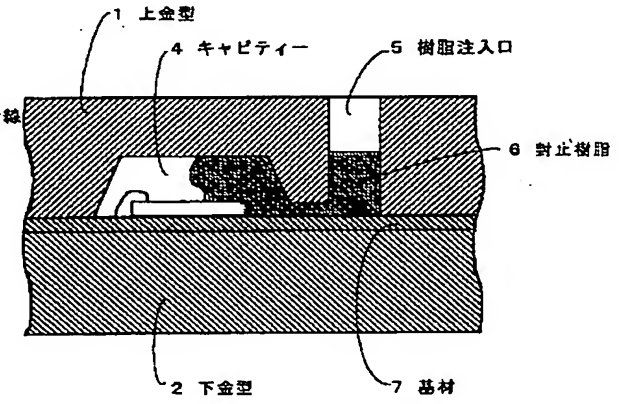


【図６】



【図７】



【図８】